

CLAIMS

We claim:

1. A cheese brining apparatus comprising:

a tank having a first side wall spaced from a second side wall, the tank defining
5 at least one brining cell and having a fluid inlet and a fluid outlet, the cell
having brine therein;

a frame positioned within the tank;

a looped belt which extends in a continuous path around the frame and which
10 extends into the brine within the tank, wherein a plurality of flights
protrude outwardly from the belt, the flights being positioned to engage
floating cheese blocks introduced into the cell at the fluid inlet, and the
cheese blocks are restrained between the belt and the tank first side wall
as the belt extends downwardly, and the cheese blocks are restrained
15 between the belt and the tank second side wall as the belt extends
upwardly; and

a drive mounted to advance the belt within the cell, and to drive the flights
downwardly along a downward run to submerge the engaged cheeses
within the cell, and then to restrain the floating cheeses along an upward
run as the belt is returned to its original starting location.

20 2. The apparatus of claim 1 wherein the tank is fabricated of stainless steel
and is supported on a support structure within a below ground sump.

3. The apparatus of claim 1 further comprising a plurality of tanks each having a fluid inlet, a fluid outlet, and a conveyor assembly within each tank for advancing cheese blocks from the fluid inlet to the fluid outlet, and wherein the fluid inlets of all the tanks are connected to a common inlet flume, and the fluid outlets of all the tanks are connected to a common outlet flume.

4. The apparatus of claim 1 wherein the tank has a first side wall and a second side wall which are joined at a bottom wall, and wherein the first side wall converges towards the second side wall as the side walls extend towards the bottom wall.

5. The apparatus of claim 4 wherein the belt as it extends along the downward run converges toward the belt extending along the upward run, and wherein the flights are angled downwardly from the horizontal as they are moved along the downward run and the upward run.

6. The apparatus of claim 1 wherein the belt is comprised of a plurality of rigid plastic links which are pinned together, and the flights are formed as portions of selected links.

7. The apparatus of claim 1 wherein the frame with the belt and drive are removable from the tank.

8. The apparatus of claim 7 further comprising a clean-in-place tank positioned generally parallel to the tank, and being dimensioned to receive the frame with the belt and the drive for cleaning thereof.

9. The apparatus of claim 1 further comprising a controller which advances the belt when it is determined that a volume under a flight is full.

10. A cheese brining apparatus comprising:

a tank having opposed side walls which defines a brining cell having brine therein;

a frame supported on the tank and having portions which are submerged within the tank, the frame having two upper side segments connected together, and two lower side segments connected together, and at least one upper axle is mounted between the two upper side segments, and at least one lower axle is mounted between the two lower side segments, the axles supporting a plurality of sprockets;

a continuous looped belt mounted to the frame and encircling the upper axle and the lower axle, the belt having a plurality of flights which project outwardly from the belt toward a tank side wall, a downward run being defined between the belt as it extends downwardly from the at least one upper axle to the lower axle and one tank side wall, wherein cheese blocks are retained between said one tank side wall and the belt as they traverse the downward run and an upward run being defined between the belt as it extends upwardly from the lower axle to the at least one upper axle and another tank side wall, and wherein the cheese blocks are retained between said another tank side wall and the belt as they traverse the upward run; and

a drive mounted to at least one axle to rotate the belt and to advance cheese blocks submerged within the brine in the tank down the downward run, beneath the lower axle, and up the upward run.

11. The apparatus of claim 10 wherein the tank is fabricated of stainless steel and is supported on a support structure within a below ground sump.

12. The apparatus of claim 10 wherein the tank has a fluid inlet adjacent the downward run, and a fluid outlet adjacent the upward run, and further comprising a plurality of tanks each having a fluid inlet, a fluid outlet, and a conveyor assembly within each tank for advancing cheese blocks from the fluid inlet to the fluid outlet, and
5 wherein the fluid inlets of all the tanks are connected to a common inlet flume, and the fluid outlets of all the tanks are connected to a common outlet flume.

13. The apparatus of claim 10 wherein the tank opposed side walls comprise a first side wall and a second side wall which are joined at a bottom wall, and wherein the first side wall converges towards the second side wall as the side walls extend
10 towards the bottom wall.

14. The apparatus of claim 13 wherein the belt as it extends along the downward run converges toward the belt extending along the upward run, and wherein the flights are angled downwardly from the horizontal as they are moved along the downward run and the upward run.

15 15. The apparatus of claim 10 wherein the belt is comprised of a plurality of rigid plastic links which are pinned together, and the flights are formed as portions of selected links.

16. The apparatus of claim 10 wherein the frame with the belt and drive are removable from the tank.

20 17. The apparatus of claim 16 further comprising a clean-in-place tank positioned generally parallel to the tank, and being dimensioned to receive the frame with the belt and the drive for cleaning thereof.

18. The apparatus of claim 10 further comprising a controller which advances the belt when it is determined that a volume under a flight is full.

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19. A cheese brining apparatus comprising:

a first brine tank;

a first conveyor assembly positioned within the first brine tank, the first
conveyor assembly having a looped belt which traverses a continuous
path within the first brine tank, the belt having a plurality of flights
which project outwardly from the belt, and a drive is mounted to advance
the belt within the first brine tank such that a cheese block received
within the tank is engaged by one of the plurality of flights and advanced
downwardly within the first brine tank adjacent a first side wall and
upwardly within the first brine tank adjacent a second side wall opposite
the first side wall;

a second brine tank spaced from the first brine tank;

a second conveyor assembly positioned within the second brine tank, the second
conveyor assembly having a looped belt which traverses a continuous
path within the second brine tank, the belt having a plurality of flights
which project outwardly from the belt, and a drive is mounted to advance
the belt within the second brine tank such that a cheese block received
within the tank is engaged by one of the plurality of flights and advanced
downwardly within the second brine tank adjacent a first side wall and
upwardly within the second brine tank adjacent a second side wall
opposite the first side wall;

an inlet flume extending between the first brine tank and the second brine tank;
at least one gate mounted within the inlet flume and operable to selectively
introduce a sequence of floating cheese blocks within the inlet flume into
either the first tank or the second tank; and

an outlet flume extending between the first brine tank and the second brine tank,
the outlet flume being connected to receive brined cheese blocks from
the first brine tank and the second brine tank.

20. The apparatus of claim 19 wherein the first tank and the second tank are fabricated of stainless steel and are supported on a support structure within a below ground sump.

5 21. The apparatus of claim 19 wherein the each tank has a first side wall and a second side wall which are joined at a bottom wall, and wherein the first side wall converges towards the second side wall as the side walls extend towards the bottom wall.

10 22. The apparatus of claim 21 wherein within each tank, the belt as it extends along the downward run converges toward the belt extending along the upward run, and wherein the flights are angled downwardly from the horizontal as they are moved along the downward run and the upward run.

23. The apparatus of claim 19 wherein each belt within a tank is comprised of a plurality of rigid plastic links which are pinned together, and the flights are formed as portions of selected links.

15 24. The apparatus of claim 19 further comprising:
a first gate positioned to control the movement of cheese blocks from the inlet flume into the first tank;
a second gate positioned to control the movement of cheese blocks from the inlet flume into the second tank; and
20 a controller which operates the first gate and the second gate to advance a flow of cheese blocks into first the first tank, and then, once a maximum number of cheese blocks have been received therein, to halt entry of cheese blocks into the first tank, and to direct cheese blocks into the second tank by adjusting the positions of the first gate and the second
25 gate.

25. The apparatus of claim 24 further comprising:

a third gate positioned to control the movement of cheese blocks from the first tank out into the outlet flume; and

a fourth gate positioned to control the movement of cheese blocks from the second tank out into the outlet flume, and wherein the controller controls the positions of the third gate and the fourth gate to control discharge of cheese blocks from the first tank and the second tank into the outlet flume.

26. The apparatus of claim 19 further comprising:

a crane positioned above the first tank and the second tank to selectively engage the first conveyor assembly or the second conveyor assembly, and to extract the engaged conveyor assembly from within its tank; and

a clean-in-place tank spaced from the first tank and the second tank, and positioned beneath the crane, to receive therein the extracted conveyor assembly for cleaning and subsequent return to one of the first tank and the second tank.

27. A cheese brining apparatus comprising:

a brine tank having a first side wall and a second side wall, the first side wall and the second side wall converging to a bottom wall to define a brining cell;

a frame extending within the tank and having at least one upper axle with at least one sprocket affixed thereto, and at least one lower axle with at least one sprocket affixed thereto;

a looped belt mounted to the frame and encircling the upper axle and lower axle sprockets, wherein a drive is mounted to advance the belt in a drive direction, wherein the belt advances along a downward run between the at least one upper sprocket and the at least one lower sprocket as it moves downward within the tank, and the belt advances along an upward run between the at least one lower sprocket and the at least one upper sprocket as it moves upward within the tank, and wherein the upward run converges toward the downward run closer to the bottom wall of the tank, such that the downward run and the upward run are inclined from the vertical; and

a plurality of flights which project outwardly from the belt, the flights on the downward run projecting toward the first tank side wall, and the flights on the upward run projecting towards the second tank side wall, the flights extending approximately perpendicular to the belt such that the flights are angled downwardly from a horizontal plane as they travel along the downward run and the upward run, to thereby engage cheese blocks between the flights and the belt.